UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/702,457	11/07/2003	Hiroshi Nagaeda	1095.1288	9709

21171 7590 05/03/2004

STAAS & HALSEY LLP
SUITE 700
1201 NEW YORK AVENUE, N.W.
WASHINGTON, DC 20005

EXAMINER	
TRA, TUYEN Q	
ART UNIT	**PAPER NUMBER**
2873	

DATE MAILED: 05/03/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/702,457	NAGAEDA, HIROSHI	
	Examiner	Art Unit	
	Tuyen Q Tra	2873	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *07 November 2003*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-16* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *9-16* is/are allowed.

6)☒ Claim(s) *1-8* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *07 November 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *0404*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Oath/Declaration

1. The declaration has been received on **11/07/03**.

Drawings

2. The Drawings filed on **11/07/03** have been declared formal by the examiner.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 1-8 are rejected under 35 U.S.C. 102(b) as being anticipated by Kawai et al. (EP 0940704 A2).

a) With respect to claim 1, Kawai et al. discloses a Faraday rotator in Figures 4 and 11 comprising of wherein Faraday rotation is caused by a first magnetic field (items 40 & 41) applied to a magneto-optical crystal of the Faraday rotator (item 33), a Faraday rotation angle is controlled by a second magnetic field (item 42) over an entire variable strength range of the second magnetic field, and the magneto-optical crystal (33) is positioned in such a manner that a direction of a combined magnetic field (Fig. 11) of the first and second magnetic fields, except for a direction of the first magnetic field, is variable intermediately between an easy magnetization axis and hard magnetization axis of the magneto-optical crystal (paragraph 0028, lines 25-30).

b) With respect to claims 2 and 6, Kawai et al. discloses an Faraday rotator in Figure 3 comprising of wherein the Faraday rotator is associated with a driving circuit, the driving circuit

comprising an electromagnet including a magnetic core having a coil wound thereon and adapted to generate the second magnetic field, a voltage source whose output voltage has no temperature coefficient and a series resistor connected in series with the voltage source, or comprising the electromagnet, a current source whose output current has no temperature coefficient and a parallel resistor connected in parallel with the current (paragraph 0028, lines 31-33).

c) With respect to claims 3-5, Kawai et al. further discloses wherein the coil comprises a wire made of copper or copper compound; wherein the series resistor or the parallel resistor comprises a resistor made of Nichrome; wherein the series resistor or the parallel resistor comprises a variable resistor.

d) With respect to claim 7, Kawai et al. discloses an Faraday rotator in Figs. 2A and 11 comprising of a polarizer (item14) made of a birefringent crystal and arranged on an incoming side of the optical signal; an analyzer (item 16) made of a birefringent crystal and arranged on an outgoing side of the optical signal; and a Faraday rotator (item 15) inserted between the polarizer and the analyzer, wherein Faraday rotation is caused by a first magnetic field applied to a magneto-optical crystal of the Faraday rotator, a Faraday rotation angle is controlled by a second magnetic field over an entire variable strength range of the second magnetic field, and the magneto-optical crystal is that a direction of a combined positioned in such a manner magnetic field of the first and second magnetic fields, except for a direction of the first magnetic field, is variable intermediately between an easy magnetization axis and hard magnetization axis of the magneto-optical crystal (paragraph 0028, lines 25-30).

d) With respect to claim 8, Kawai et al. discloses an Faraday rotator in Fig. 2A and 11 wherein the Faraday rotator is associated with a driving circuit, the driving circuit comprising an electromagnet including a magnetic core having a coil wound thereon and adapted to generate the second magnetic field, a voltage source whose output voltage has no temperature coefficient and a series resistor connected in series with the voltage source, or comprising the electromagnet, a current source whose output current has no temperature coefficient and a parallel resistor connected in parallel with the current source.

Allowable Subject Matter

5. Claims 9-16 are allowed.

The reason for the indication of allowable subject matter is that (claim 9) a polarizer made of a birefringent crystal and arranged on an incoming side of the optical signal; a reflector element for reflecting the optical signal; and a Faraday rotator inserted between the polarizer and the reflector element, wherein Faraday rotation is caused by a first magnetic field applied to a magneto-optical crystal of the Faraday rotator, a Faraday rotation angle is controlled by a second magnetic field over an entire variable strength range of the second magnetic field, and the magneto-optical crystal is positioned in such a manner that a direction of a combined magnetic field of the first and second magnetic fields, except for a direction of the first magnetic field, is variable intermediately between an easy magnetization axis and hard magnetization axis of the magneto-optical crystal.; (claim 11) a polarizer made of a birefringent crystal and arranged on an incoming side of an optical signal; an analyzer made of a birefringent crystal and arranged on an outgoing side of the optical signal; a Faraday rotator inserted between the polarizer and the analyzer, wherein Faraday rotation is caused by a first

magnetic field applied to a magneto-optical crystal of the Faraday rotator, a Faraday rotation angle is controlled by a second magnetic field over an entire variable strength range of the second magnetic field, and the magneto-optical crystal is positioned in such a manner that a direction of a combined magnetic field of the first and second magnetic fields, except for a direction of the first magnetic field, is variable intermediate between an easy magnetization axis and hard magnetization axis of the magneto-optical crystal; and a driving circuit for switching a current value thereof between a value at which an amount of optical attenuation is at a minimum and a value at which the amount of optical attenuation is at a maximum; (claim 13) a polarizer made of a birefringent crystal and arranged on an incoming side of an optical signal; a reflector element for reflecting the optical signal ; a Faraday rotator inserted between the polarizer and the reflector element, wherein Faraday rotation is caused by a first magnetic field applied to a magneto-optical crystal of the Faraday rotator, a Faraday rotation angle is controlled by a second magnetic field over an entire variable strength range of the second magnetic field, and the magneto-optical crystal is positioned in such a manner that a direction of a combined magnetic field of the first and second magnetic fields, except for a direction of the first magnetic field, is variable intermediately between an easy magnetization axis and hard magnetization axis of the magneto-optical crystal; and a driving circuit for switching a current value thereof between a value at which an amount of optical attenuation is at a minimum and a value at which the amount of optical attenuation is at a maximum; (claim 15) rotator for causing a rotation of the polarization angle which is opposite in direction to the rotation of the polarization angle caused by the first Faraday rotator and which has an absolute value equal to that of the rotation of the polarization angle caused by the first Faraday rotator, wherein Faraday

rotation is caused by a first magnetic field applied to a magneto-optical crystal of the second Faraday rotator, a Faraday rotation angle is controlled by a second magnetic field over an entire variable strength range of the second magnetic field, and the magneto-optical crystal is positioned in such a manner that a direction of a combined magnetic field of the first and second magnetic fields, except for a direction of the first magnetic field, is variable intermediately between an easy magnetization axis and hard magnetization axis of the magneto-optical a second Faraday crystal; a phase difference control element for compensating for a phase difference between P-polarized light and S-polarized light caused in the wavelength-dependent transmittance characteristic varying element; and a polarization plane restoration element for combining the ordinary light and the extraordinary light disclosed in the claims is not found in the prior art.

Conclusion

6. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Ikeda et al. (US Patent 6,392,784 B1) discloses an faraday rotator in Fig. 6 and 9 with easy and hard axes in relation with direction rotation of composite magnetic vector (col. 8, lines 57-67; col. 9, lines 1-6)

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tuyen Tra whose telephone number is (703) 306-5712. The examiner can normally be reached on Monday to Thursday from 8:30am to 6:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Georgia Epps, can be reached on (703) 308-4883. The fax number for this Group is (703) 308-7722.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Group receptionist whose telephone number is (703) 308-0956.

tt

April 16, 2004